

RECEIVED
CENTRAL FAX CENTERAMENDMENTS TO THE CLAIMS

DEC 11 2007

1. (Currently amended): A method of managing resource usage comprising:
 - queueing accesses of at least one associated resource in associated at least one respective resource queue;
 - monitoring queue depth in the at least one resource queue for a predetermined level of resource consumption;
 - preventing issue of subsequent commands from a client to a server in a client/server combination in response to a command of the client/server combination that increases resource consumption to the predetermined level;
 - ~~queueing pushing an identifier of the client/server combination on a onto a~~
~~waiting queue associated with a resource for which the resource~~
~~consumption is increased to the predetermined level that holds~~
~~identifiers of client/server combinations;~~
 - ~~detecting a decline in consumption of a resource of the at least one~~
~~resource;~~
 - ~~removing the popping a client/server combination identifier from the waiting~~
~~a waiting queue associated with the resource for which a decline in~~
~~consumption is detected in a queuing-order of queuing as resource~~
~~consumption declines; and~~
 - re-enabling issue of commands from the client to the server in the designated by the popped client/server combination identifier.

2. (Previously presented): The method according to Claim 1 further comprising:

managing resource usage for clients that require a specific resource.

3. (Previously presented): The method according to Claim 1 further comprising:

enabling issue of commands of a client/server combination in order of queuing as resource availability is restored.

KOESTNER BERTANI LLP
2120 MARTIN ST
SUITE 150
IRVINE, CA 92612
TEL (949) 251-0250
FAX (949) 251-0260

4. (Previously presented): The method according to Claim 1 further comprising:

receiving a command from a client to a server that increases consumption of a resource to a predetermined resource consumption condition; setting a flag indicative of the predetermined resource condition; allowing the command to complete; and rejecting subsequent commands issued by the client to the server.

5. (Original): The method according to Claim 1 further comprising: detecting an increase in consumption of a resource to a level above a preselected limit; and queuing an identifier of the client/server combination on a waiting queue associated with the resource.

6. (Previously presented): The method according to Claim 5 further comprising:

detecting a decline in consumption of the resource; removing a client/server combination identifier from the waiting queue in the queue order; and enabling subsequent commands of the client/server combination removed from the waiting queue for operation.

7. (Original): The method according to Claim 1 implemented in a storage system further comprising:

at least one storage controller; at least one host adapter operational as a client; at least one storage array configured as physical storage and logical storage, the logical storage being arranged in logical units (LUNs) operational as servers; at least one adapter/LUN combination operational as a client/server combination; and at least one resource selected from a group consisting of dynamic caching structures, queues, buffers, and remote copy resources.

KOESTNER BERTANI LLP

1100 MANTLE ST
SUITE 110
IRVINE, CA 92613
TEL (714) 251-0260
FAX (714) 251-0260

8. (Currently amended): A storage system comprising:
at least one storage controller controlling data transfers between at least one host adapter and at least one storage array configured as physical storage and logical storage, the logical storage being arranged in logical units (LUNs);
at least one resource utilized in the data transfers;
at least one resource queue respectively associated with the at least one resource that queues accesses to the associated resource; and a logic that queues accesses of at least one resource in associated at least one resource queue, monitors queue depth in the at least one resource queue for a predetermined resource consumption condition, identifies an adapter that issues commands to a LUN in an adapter/LUN combination associated with a command that contributes to the predetermined resource consumption condition, queues an identifier of the identified adapter/LUN combination on a waiting queue associated with a resource for which the resource consumption is increased to the predetermined level, and prevents issue of subsequent commands of the identified adapter/LUN combination.

9. (Currently amended): The storage system according to Claim 8 further comprising:

a logic that detects a decline in resource consumption of a predetermined resource, dequeues the adapter/LUN combination identifier from the waiting a waiting queue associated with the predetermined resource for which a decline in consumption is detected, and re-enables commands of the dequeued adapter/LUN combination for operation.

10. (Original): The storage system according to Claim 8 further comprising:

at least one resource selected from a group consisting of dynamic caching structures, queues, buffers, and remote copy resources.

KOESTNER BERTANI LLP
2192 MARTIN ST
SUITE 150
IRVINE, CA 92612
TEL (714) 251-0250
FAX (714) 251-0260

11. (Previously presented): The storage system according to Claim 8 further comprising:
a logic that manages resource usage for host adapters that require a specific resource.

12. (Previously presented): The storage system according to Claim 8 further comprising:
a logic that detects receipt of a command from an adapter to a LUN that increases consumption of a resource above a preselected limit, sets a flag indicative of a predefined condition of the resource, allows the received command to complete, and rejects subsequent commands issued by the adapter to the LUN.

13. (Original): The storage system according to Claim 8 further comprising:
a logic that detects an increase consumption of a resource above the preselected limit, and queues an identifier of the adapter/LUN combination on a waiting queue associated with the resource.

14. (Previously presented): The storage system according to Claim 13 further comprising:
a logic that detects a decline in consumption of the resource, removes an adapter/LUN combination identifier from the waiting queue in the queue order, and enables subsequent commands of the adapter/LUN combination removed from the waiting queue for operation.

15. (Currently amended): A data handling system comprising:
at least one controller controlling data transfers between at least one client and at least one server;
at least one resource utilized in the data transfers;
at least one resource queue respectively associated with the at least one resource that queues accesses to the associated resource; and

KOESTNER BERTANI LLP

2102 MARTIN ST
SUITE 150
DARVINE, CA 92512
TEL (949) 251-0250
FAX (949) 251-0260

a logic that queues accesses of at least one resource in associated at least one resource queue, monitors queue depth in the at least one resource queue for a predetermined resource consumption condition, identifies a source that issues commands to a client in a source/client combination associated with a command that contributes to the predetermined resource consumption condition, queues an identifier of the identified source/client combination on a waiting queue associated with a resource for which the resource consumption is increased to the predetermined level, and prevents issue of subsequent commands of the identified source/client combination.

16. (Previously presented): The system according to Claim 15 further comprising:

a logic that detects receipt of a command from a client to a server that increases consumption of a resource above a preselected limit, sets a flag indicative of a predefined condition of the resource, allows the received command to complete, and rejects subsequent commands issued by the client to the server.

17. (Original): The system according to Claim 15 further comprising: a logic that detects an increase in consumption of a resource above the preselected limit, queues an identifier of the client/server combination on a waiting queue associated with the resource.

18. (Previously presented): The system according to Claim 17 further comprising:

a logic that detects a decline in consumption of the resource, removes a client/server combination identifier from the waiting queue in the queue order, and enables subsequent commands of the client/server combination removed from the waiting queue for operation.

KOESTNER_BERTANI LLP

2192 MARTIN ST
SUITE 150
IRVINE, CA 92612
TEL (714) 251-0250
FAX (714) 251-0280

19. (Currently amended): An article of manufacture comprising:
a tangible processor usable medium having a readable program code
embodied therein for managing resource usage, the readable
program code further comprising:
a code causing the controller a controller to queue accesses of at
least one associated resource in associated at least one
respective resource queue;
a code causing the controller to monitor for a predefined level of
resource consumption;
a code causing the controller to prevent issue of subsequent
commands from a client to a server in a client/server
combination in response to a command of the client/server
combination that increases resource consumption to the
predefined level;
a code causing the controller to queue push an identifier of the
client/server combination on-a onto a waiting queue
associated with a resource for which the resource
consumption is increased to the predetermined level that
holds identifiers of client/server combinations;
a code causing the controller to detect a decline in consumption of a
resource of the at least one resource;
a code causing the controller to remove the pop a client/server
combination identifier from the waiting a waiting queue
associated with the resource for which a decline in
consumption is detected in a queuing order of queuing as
resource consumption declines; and
a code causing the controller to enable issue of commands from
the client to the server in the designated by the popped
client/server combination identifier.

KOESTNER BERTANI LLP
2192 MARTIN ST
SUITE 190
IRVINE, CA 92612
TEL: (714) 571-4230
FAX: (714) 251-0260

20. (Previously presented): The article of manufacture according to
Claim 19 further comprising:

a code causing the controller to manage resource usage for clients that
require a specific resource;

a code causing the controller to receive a command from a client to a server that increases consumption of a resource above a preselected limit;

a code causing the controller to set a flag indicative of a condition of the resource;

a code causing the controller to allow the command to complete; and

a code causing the controller to reject subsequent commands issued by the client to the server.

21. (Previously presented): The article of manufacture according to Claim 19 further comprising:

a code causing the controller to detect an increase in consumption of a resource above a preselected limit;

a code causing the controller to queue an identifier of the client/server combination on a waiting queue associated with the resource;

a code causing the controller to detect a decline in consumption of the resource;

a code causing the controller to remove a client/server combination identifier from the waiting queue in the queue order; and

a code causing the controller to enable subsequent commands of the client/server combination removed from the waiting queue for operation.

KOESTNER BERTANI LLP
2192 MARTIN ST
SUITE 180
IRVINE, CA 92612
TEL: (714) 211-0200
FAX: (714) 211-0200